The Cannabis Youth Treatment (CYT) Experiment: Preliminary Findings

A report to H. Westley Clark, M.D., J.D., M.P.H. , Director
Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services
Administration, Department of Health and Human Services.

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Prepared in Collaboration with:

Coordinating Center Director and Chair
Michael L. Dennis, Ph.D.[1]

Site Directors and Other Executive Committee Members
Thomas F. Babor, Ph.D.[2,3], Guy Diamond, Ph.D.[4,5], Jean Donaldson[6], M.A., Susan H. Godley, Rh.D.[1], Janet C. Titus, Ph.D.[1], Frank Tims, Ph.D.[7,8], Charles Webb, Ph.D.[2], Jim Herrell, Ph.D.[6]

Other Steering Committee Members
Betty J. Buchan, Ph.D., DFTCB[7], Joseph A. Burleson, Ph.D.[2,3], James Fraser, M.S.[1], Michael French, Ph.D.[9], Mark D. Godley, Ph.D.[1], Nancy Hamilton, M.P.A.[7], Ronald Kadden, Ph.D.[10], Yifrah Kaminer, M.D.[2], Howard Liddle, Ed.D.[11], M. Christopher Roebuck, M.B.A.[9], Susan Sampl, Ph.D.[10], Christy K Scott, Ph.D.[1], Manuel Tejeda, Ph.D.[11,12], and Willam L.White., M.A.[1]

And the assistance of Other CYT Staff
Nancy Angelovich, M.A.[7], Rodney Funk, B.S.[1], David Hodgkins, MCSE[1], Tracy L. Karvinen, M.A.[1], Jodi J. Leckrone, M.A.[4], Susie Mindel-Panichelli, Ph.D.[4], Meleney Scudder, Psy.D.[2], Melissa Siekmann, M.P.A.[1], Zeena Tawfik[2], Joan Unsicker, M.S.[1], James West, M.A.[1] Michelle White, B.S.[1] and others.

[1] Chestnut Health Systems(CHS), Bloomington, Madison County, and Chicago, IL
[2] Alcohol Research Center (ARC), University of Connecticut Health Center, Farmington, CT
[3] Department of Community Medicine and Health Care, University of Connecticut Health Center, Farmington, CT
[4] Child Guidance Center (CGC) of the Children's Hospital of Philadelphia, Philadelphia, PA
[5] University of Pennsylvania, Philadelphia, PA
[6] Center for Substance Abuse Treatment (CSAT) of the Substance Abuse and Mental Health Services Adminstration, Rockville, MD
[7] Operation PAR, Inc., St. Petersburg, FL
[8] University of South Florida, Tampa, FL
[9] Health Services Research Center, University of Miami, Miami, FL
[10] Department of Psychiatry, University of Connecticut Health Center, Farmington, CT
[11] Center for Treatment Research on Adolescent Drug Abuse, University of Miami School of Medicine, Miami, FL
[12] Barry University, Miami Shores, FL

Executive Summary

The Cannabis Youth Treatment Study (CYT) is a collaboration among the Center for Substance Abuse Treatment (CSAT), academic researchers and treatment providers from Chestnut Health Systems (CHS) in Bloomington and Madison County, Illinois, the Alcohol Research Center (ARC) at the University of Connecticut, Operation PAR in St. Petersburg, Florida, and the Child Guidance Center (CGC) at the Children's Hospital of Philadelphia. CYT is designed to adapt 5 promising adolescent treatments for use in clinical practice, and then to field test their effectiveness in the largest randomized experiment ever conducted with adolescent marijuana users seeking outpatient treatment. Preliminary results suggest that all 5 treatments are more effective than current practice, so CSAT is releasing the manuals to the field this fall. This report describes the need for marijuana-specific treatment, provides a description of the study, and presents the preliminary findings of the CYT study released on September 7, 2000. Findings from the project are being posted at www.chestnut.org/li/CYT and copies of the 5 treatment manuals will be available this fall from CSAT at www.samhsa.gov/CSAT .

Adolescent marijuana use increases 4- to 6-fold between the ages of 12 and 22, is increasingly used at younger ages and is twice the rate it was 10 years ago among 8th graders. Adolescent marijuana use is associated with many emotional, behavioral, health and legal problems and is now the leading substance (even exceeding alcohol) mentioned in emergency room admissions and autopsies. From 1992 to 1997, the number of adolescents presenting to publically-funded treatment for marijuana problems increased over 200%. In 1997, 81% of adolescents admitted to treatment had a primary, secondary or tertiary problem with marijuana.

Outpatient Treatment is the most common setting (81%) in which adolescents are treated for marijuana use. However, national evaluations of existing programs have produced mixed results and been plagued by methodological problems including low treatment dosage (median lengths of stay were all under 2 months), lack of written treatment manuals (making replication difficult), and high attrition from follow-up (30-50%). Post-treatment outcomes ranged from decreasing use by 15% to increasing use by 10%. While outpatient treatment appeared to produce better results than no treatment (where the relapse and use rates increased even more), there is clearly room to improve over the current 85-100% relapse rates after treatment. CYT was also designed to address many of these methodological problems as well.

Five promising manual-guided treatments were developed by the CYT collaborating team for field testing to represent real programmatic and policy treatment options. They are:
1. *Motivational Enhancement Therapy/Cognitive-Behavioral Therapy (MET/CBT5)* - This is a 5-session treatment with 2 individual sessions to motivate the adolescent to change and 3 group sessions on marijuana refusal skills, increasing social support for abstinence, and relapse prevention.
2. *Cognitive Behavior Therapy 7 (CBT7)* - This treatment was designed to follow MET/CBT5, and provides additional group sessions on other common topics including problem-solving, dealing with anger and criticism, coping with cravings and relapse, and depression management.
3. *The Family Support Network (FSN)* - This treatment is designed to supplement MET/CBT or other types of treatment with additional support for families (home visits, parent education meetings), and case management.

4.   ***The Adolescent Community Reinforcement Approach (ACRA)*** - This approach is composed of 14 individual sessions with the adolescent and/or the adolescent's "concerned other" that focus on learning alternative skills to cope with problems and to change the environmental contingencies related to continued substance use.

5.   ***Multidimensional Family Therapy (MDFT***) - In this approach, substance abuse treatment is integrated into 12 weeks of family-focused treatment (plus other phone and case management contact) that involves working with the adolescents and their families on family roles, and other problem areas.

These treatments vary in terms of length (6 to 14 weeks), mode (individual, group, and family), planned number of sessions (5 to 23), theoretical orientation, and their approach to resource utilization/cost. All approaches have been recommended by expert panels and/or by earlier reviews of treatment research.

The CYT project recruited 600 adolescent participants (as well as their families) who were between the ages of 12-18, reported using marijuana in the past 90 days, reported problems related to marijuana abuse or dependence, and met placement criteria for outpatient (vs. inpatient) substance abuse treatment. These adolescents were then randomly assigned to 1 of 3 treatments offered at a given site. In the "incremental" study arm – in which each subsequent intervention builds upon the features of the previous intervention – the researchers compared the 5-session MET/CBT treatment, the 12-session MET/CBT treatment, and the 23-session combined MET/CBT and Family Support Network (FSN) treatment. These treatments were offered at the Connecticut and Florida sites. In the "alternative" study arm, the researchers compared the 5-session MET/CBT treatment, the 14-session Adolescent Community Reinforcement Approach, and the 15-session Multidimensional Family Therapy (MDFT) treatment. These treatments were offered at the Illinois and Philadelphia sites. Sites were matched so that each treatment was offered in both a major community-based clinic and a major medical center clinic. Adolescents were then interviewed quarterly for a year (including parent/guardian interviews and urine tests at 3 and 6 months post intake). The CYT staff have already completed 3- and 6-month follow-up interviews on over 90% of the adolescents and their parents/guardians, and are currently doing the 9- and 12-month interviews.

The average length of stay in the briefest treatment (5 to 6 weeks) was 38.8 days, with 68% completing 4 or more formal sessions of treatment. The average length of stay in the other treatments (12 to 14 weeks) was 89.8 days, with 67% completing 8 or more formal sessions of treatment. This is much better than in prior studies where less than half stayed in treatment for 8 weeks.

The participating adolescents were predominantly male (83%), Caucasian (62%) or African American (30%), age 15 or 16 (55%), from single parent families (50%), and still attending school (87%). Most had a history of arrest (71%), were currently involved in the criminal justice system (62%), faced regular peer use of drugs (89%) and/or alcohol (64%), were sexually active (72%) or had a history of victimization (57%). Over 71% used marijuana weekly (19% were smoking 20 or more joints in a day) and 48% met criteria for dependence (50% for abuse). Most also smoked tobacco (80%), drank alcohol (72%) and/or had multiple emotional or behavioral problems. At the time of admission, 74% had never been in substance abuse treatment and 80% thought they did not have a drug or alcohol problem.

Overall, treatment outcomes improved dramatically between intake, 3 and 6 months later. There were significant increases in the percent of adolescents reporting no past-month use (4% to

13% to 34%) and the percent reporting no past-month abuse or dependence symptoms (19% to 39% to 61%). The rate of any use decreased by 31% between the 3 months before and after treatment – better than in all prior studies of adolescent outpatient treatment in community settings. Improvements were also seen in terms of decreased involvement with the criminal justice system, decreased attention, family, and school problems, and decreased illegal activity and fighting/violence. However, 1 in 5 adolescents treated in CYT also went on to get additional treatment, suggesting that while effective, these brief (6-12 week) treatments may not be sufficient for everyone.

Significant Differences were found by type of treatment, problem severity and their interaction, as well as differences in the pattern of outcomes over time. In the incremental study arm (Treatments 1,2,3), the brief intervention had significantly larger reductions in substance related problems with the lowest severity participants, while the comprehensive treatment (3) worked better with the higher severity participants. Outcomes continued to improve, and at 6 months the comprehensive treatment eventually caught up with the brief intervention for low severity participants and continued to be the most effective with the high severity participants. In the alternative study arm (Treatments 1,4,5), the brief and individual behavior therapy interventions reduced use significantly more than the integrated family therapy (32% vs. 31% vs. 27%); however, at 6 months all improved further and the family therapy had caught up, so the differences were no longer statistically significant. In both the incremental and alternative study arms there were significant reductions in days in a controlled environment (one of the most expensive direct costs to society) from intake to 3 months, however these gains were lost at the 6-month follow-up. In the alternative arm, the low severity participants increased their days in a controlled environment, while the high severity participants initially reduced theirs. Within the alternative arm, individualized behavior therapy had the smallest decrease in days in a controlled environment at 3 months among the high severity participants, but also had the smallest increase at 6 months (thus ending up lower at six months). It also had the smallest rates of increase among the low severity participants across time.

The average weekly economic costs of the 5 types of outpatient treatment ranged from $105 to $244 per adolescent per week and varied by both direct factors (e.g., weeks of treatment, hours of formal treatment sessions, treatment retention) and indirect factors (e.g., cost of living, staff education level, case load variation). All of the CYT treatments cost less than both the mean ($365/week) and median ($267/week) cost reported by clinic directors of adolescent outpatient treatment in NTIES after adjusting for inflation. Thus, the CYT treatments all appear to be sustainable under current funding levels.

The CYT Steering Committee has recommended that CSAT's next step should be to release the treatment manuals this fall so they can be used by CSAT's Addiction Technology Training Centers, Targeted Capacity Expansion (TCE) grant applicants and others who wish to replicate the CYT project's success. While some significant differences appear to be emerging in their effectiveness, all 5 approaches are more effective than current practice. Which treatments are used in practice is likely to vary based on organizational staffing and resources. Thus, at this time, the researchers are not recommending one treatment over another. The researchers do, however, recommend further examination of subject-by-treatment interactions on both short- and long-term outcomes. The researchers also encourage comparisons of the 5 CYT treatments with other approaches, as there is still much room for improvement in outcomes.

THE CANNABIS YOUTH TREATMENT (CYT) EXPERIMENT: PRELIMINARY FINDINGS

The Cannabis Youth Treatment (CYT) study[1] is a multi-site randomized field experiment examining five outpatient treatment protocols for adolescents who abuse or are dependent on marijuana (and typically alcohol). Organized as a cooperative agreement, the study is funded by the Substance Abuse and Mental Health Services Administration (SAMHSA) and its Center for Substance Abuse Treatment (CSAT) under the Department of Health and Human Services (DHHS). CYT is a new kind of Knowledge Development and Application (KDA) study designed to address major gaps in the field and move the state of treatment practice forward. CYT is one of the largest adolescent substance abuse treatment experiments ever undertaken and a key component of U.S. Secretary Donna Shalala's "Youth Initiative" to address rising rates of marijuana use among adolescents in the United States[2].

As required under the terms of the cooperative agreement, this report summarizes what we have learned about the problem of adolescent marijuana use disorders, the development of effective ways for treating them, and our results to date. It is divided into four main sections providing background on the problem, its context, the study design, preliminary results and our recommendations.

THE PROBLEM AND CONTEXT

Rising Rate of Adolescent Substance Use. After declining throughout the 1980s, illicit drug use has begun to increase among adolescents. Between 1991 and 1999, past-year illicit drug use rose from 29% to 42% among 12th graders and from 11% to 21% among 8th graders.[3] Though the rate of increase has leveled off in the past three years, the current rates are almost 1.5 to 2 times the 1992 low. There is more than twice as much past-month marijuana use as all other drugs combined among adolescents in 8th grade (10% vs. 5%) and 12th grade (23% vs. 10%); marijuana is also more likely to be used daily than even alcohol by both 8th graders (1.4% vs. 1.0%) and 12th graders (6.0 vs. 3.4%). While marijuana use has historically been inversely related to the adolescent's perceived risk of using it, currently this perception among 12th graders is as low as it has been since 1982. Unfortunately, these perceptions do not match the facts.

Consequences of Marijuana Use. Relative to non-users, adolescents who used marijuana (and typically alcohol) weekly were 3 to 47 times more likely to have a host of other problems including symptoms of dependence, emergency room admissions, dropping out of school, behavioral problems, fighting, non-drug related legal problems, any legal problems, and being arrested; unfortunately, fewer than 10% of adolescents with past-year symptoms of dependence have ever received treatment.[4,5] From 1992 to 1997, the number of adolescents presenting to publically funded treatment for marijuana problems increased over 200% (from 12,488 to 25,279); In 1997, 81% of adolescents admitted had a primary, secondary or tertiary problem with marijuana[6,7] Marijuana is also the leading substance mentioned in adolescent emergency room admissions and autopsy reports and is believed to be one of the major contributing factors to violent deaths and accidents among adolescents; it has been reported to be involved in as much as 30% of adolescent motor vehicle crashes, 20% of adolescent homicides, 13% of adolescent suicides, and 10% of other unintentional injuries among adolescents.[8,9,10]

The Need for Effective Models of Outpatient Treatment for Marijuana. Of the adolescents entering treatment in 1997, 81% went into outpatient treatment, followed by 18% into residential treatment and 1% into hospital based programs.[6,7] Unfortunately, evaluations of existing outpatient treatment for adolescents have produced mixed results in terms of reducing marijuana use. Among the 111 to 158 youths (under 21) followed-up under the Drug Abuse Reporting Program [11,12] in the early 1970s, marijuana use went up by 3 to 10% ({post-pre change}/{pre use}) in the three years following their discharge. Among the 87 adolescents receiving outpatient treatment in the Treatment Outcome Prospective Study (TOPS)[13,14] in the early 1980s, the change in daily marijuana use from the year before to the year after treatment varied from a decrease of 42% for those with less than three months of treatment to an increase of 13% for those with three or more months of treatment (i.e., contrary to adult findings on length of stay[15]). Among the 156 adolescents receiving any kind of treatment in the Services Research Outcome Study (SROS)[16] during the late 1980s to early 1990s, marijuana use rose 2-9% between the five years before and after any kind of treatment. Among the 236 adolescents receiving any kind of treatment in the National Treatment Improvement Evaluation Study (NTIES)[17,18], during the early 1990s, there was a 10-18% reduction in use between the year before and after treatment. Among the 445 adolescents followed-up after outpatient treatment in the Drug Abuse Treatment Outcome Study – Adolescents (DATOS-A)[19] in the mid to late 1990s, there was a 21-25% reduction in marijuana use between the years before and after treatment. Among the 27 adolescents followed up after outpatient treatment in the Drug Outcome Monitoring Study (DOMS)[20,21], there was a 14% reduction in the days of marijuana use between the 90 days before intake and 90 days after discharge. In summary, post-treatment outcomes ranged from decreasing use by 15% to increasing use by 10%. While outpatient treatment appeared to produce better results than no treatment (where the use increases 4 to 6 fold from age 12 to 22[22] and continued use/relapse among heavy users is the norm[23,24,25,26]), there is clearly room to improve over the current 85-100% relapse rates after treatment.

Additional Challenges. Methodologically, these evaluation studies of adolescent outpatient treatment were severely limited by small samples of outpatient adolescents spread over many different programs, undefined approaches, low treatment dosages (median length of stays were all under 2 months), and marginal follow-up rates (50-70%). Complicating matters further, none of these studies was based on the kind of manual guided approaches (whether based on practice or research) that are increasingly the sine qua non for good substance abuse treatment, psychotherapy and/or pharmacotherapy.[27,28,29,30,31,32,33,34,35] Thus, the field faced major substantive and methodological challenges that beckoned for federal leadership.

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**THE CANNABIS YOUTH TREATMENT (CYT)
KNOWLEDGE DEVELOPMENT AND APPLICATION (KDA) STUDY DESIGN**

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Collaborators. As shown in Figure 1, the study is being conducted in collaboration with Chestnut Health Systems (CHS) in Bloomington and Madison County (MC), IL; the Alcohol Research Center (ARC) of the University of Connecticut Health Center (UCHC) in Farmington, CT; Operation PAR in St. Petersburg, FL; the Child Guidance Center (CGC) in Philadelphia, PA; and the University of Miami (UM) in Miami, FL. Four treatment sites are located at ARC, PAR, CHS-MC, and CGC, while the coordinating center is housed at CHS in Bloomington and Chicago, IL and supported by subcontracts with UCHC for the brief intervention and UM for the economic analysis.

Figure 1

CYT Cannabis Youth Treatment Experiment:
A Collaborative Study of the Effectiveness
of Treatment for Cannabis Use Disorders
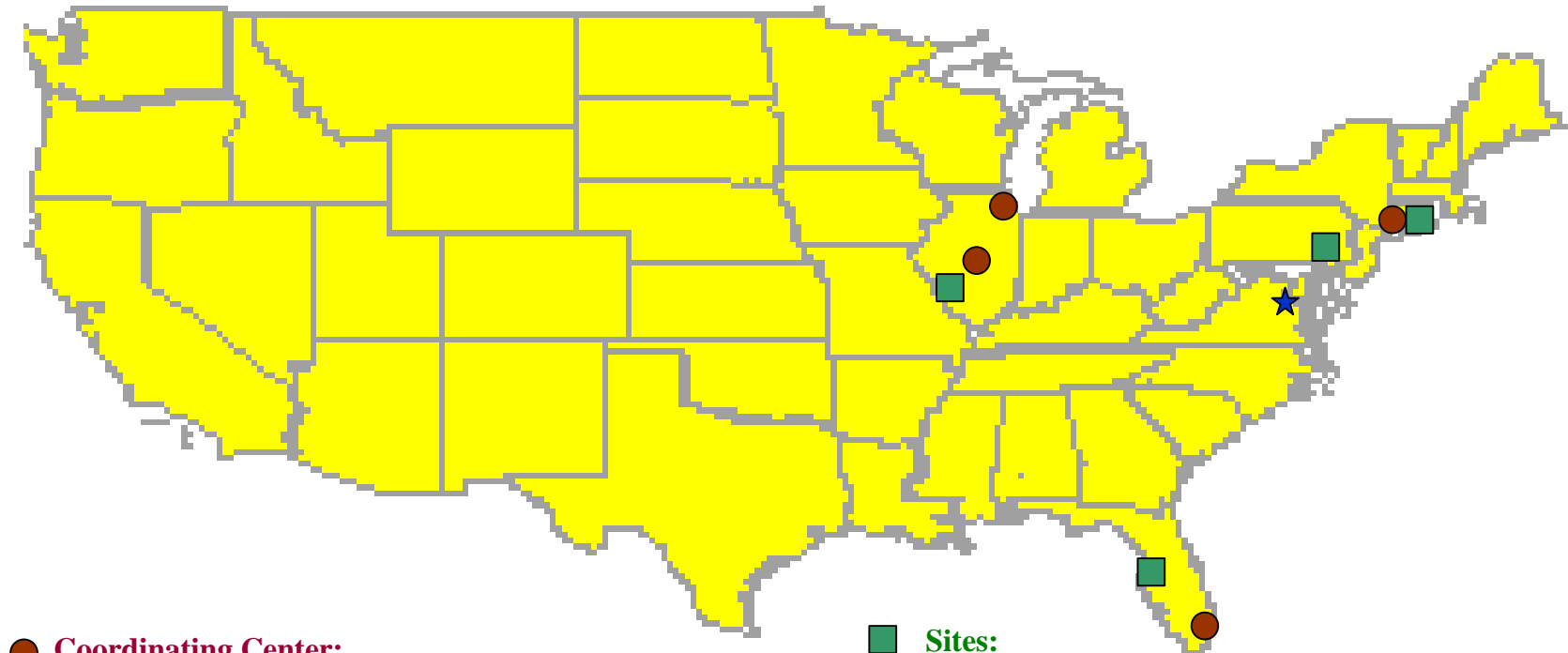
🔴 **Coordinating Center:**
Chestnut Health Systems, Bloomington, IL,
   and Chicago, IL
University of Miami, Miami, FL
University of Connecticut Health Center, Farmington, CT

🟩 **Sites:**
Alcohol Research Center, Farmington, CT
Operation PAR, St. Petersburg, FL
Chestnut Health Systems, Madison County, IL
Child Guidance Center, Philadelphia, PA

⭐ Sponsored by: Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services
Administration (SAMHSA), U.S. Department of Health and Human Services

Goals and Timeline. The purpose of the CYT project is twofold: a) to test the relative clinical effectiveness and cost-effectiveness of five promising interventions targeted at reducing or eliminating marijuana use and associated problems in adolescents; and b) to provide validated models of these interventions to the treatment field. The target population is adolescents with cannabis use disorders (abuse or dependence) who are appropriate for treatment in outpatient settings. CYT is a four-year study (October 1997 to September, 2001) with several overlapping phases. In the initial design phase (October 1997 to September 2000) we wanted to identify promising approaches to treatment that could be tested and, if effective, disseminated through professionally designed therapy manuals. In the treatment phase (June 1998 to April 2000) we recruited 600 adolescents (and their families), randomly assigned them to one of three treatments offered at a given site and provided up to 14 weeks of treatment. In the follow-up phase (September 1998 to February 2001) we are conducting quarterly follow-up interviews. Analyses are being run concurrently and will continue through the end of the project. The remainder of this paper provides a summary of the project's status and findings to date. Past products and findings are listed on the project's website (www.chestnut.org/li/cyt) and will be selectively posted on CSAT's web page (http://www.samhsa.gov/csat/csat.htm).

Promising Treatments. The CYT Steering Committee decided to test five promising approaches to outpatient treatment for adolescent marijuana use disorders:

C   *Motivational Enhancement Therapy/Cognitive-Behavioral Therapy (MET/CBT5)*[36] is a five-session treatment composed of two individual sessions of MET and three weekly group sessions of CBT. The MET sessions focus on factors that motivate participants who abuse substances to change. While in the CBT sessions, participants learn marijuana refusal skills, how to increase their social support network/non-drug activities, and how to plan to avoid or cope with a relapse. Based on previously funded NIAAA, NIDA and CSAT research manuals, it is designed to be a brief and low cost intervention that can be used as a first response by managed care and concerned families.

C   *Cognitive Behavior Therapy 7 (CBT7)*[37] is designed to follow MET/CBT5 with seven more sessions of CBT focused on problem solving, awareness of anger, anger management, receiving criticism, coping with cravings and urges to use marijuana, depression management, managing thoughts about marijuana, planning for emergencies and coping with relapse. Based on previously funded NIAAA and CSAT research manuals, the combined protocol is designed to cover many of the most basic topics in modern substance abuse treatment.

C   *The Family Support Network (FSN)*[38] provides additional support for families (home visits, parent education meetings), and case management. Based on CSAT's Treatment Improvement Protocol (TIP) developed by an expert panel of Adolescent Treatment, FSN is designed to combine with MET/CBT12 or other existing individual or group treatments.

C   *The Adolescent Community Reinforcement Approach (ACRA*)[39] is composed of fourteen individual sessions with the adolescent and/or the adolescent's "concerned other." The focus is on learning alternative skills to cope with problems and to change the environmental contingencies related to continued substance use. Based on NIAAA funded research manuals, it was designed to reflect a more individualized and behavioral approach that could be used in rural areas or where group formation may actually delay or increase the cost of treatment.

C   *Multidimensional Family Therapy (MDFT*)[40] is a family-focused treatment that includes twelve weekly sessions (plus other phone and case management contact) to work individually with the adolescents and their families on roles, other problem areas, and their
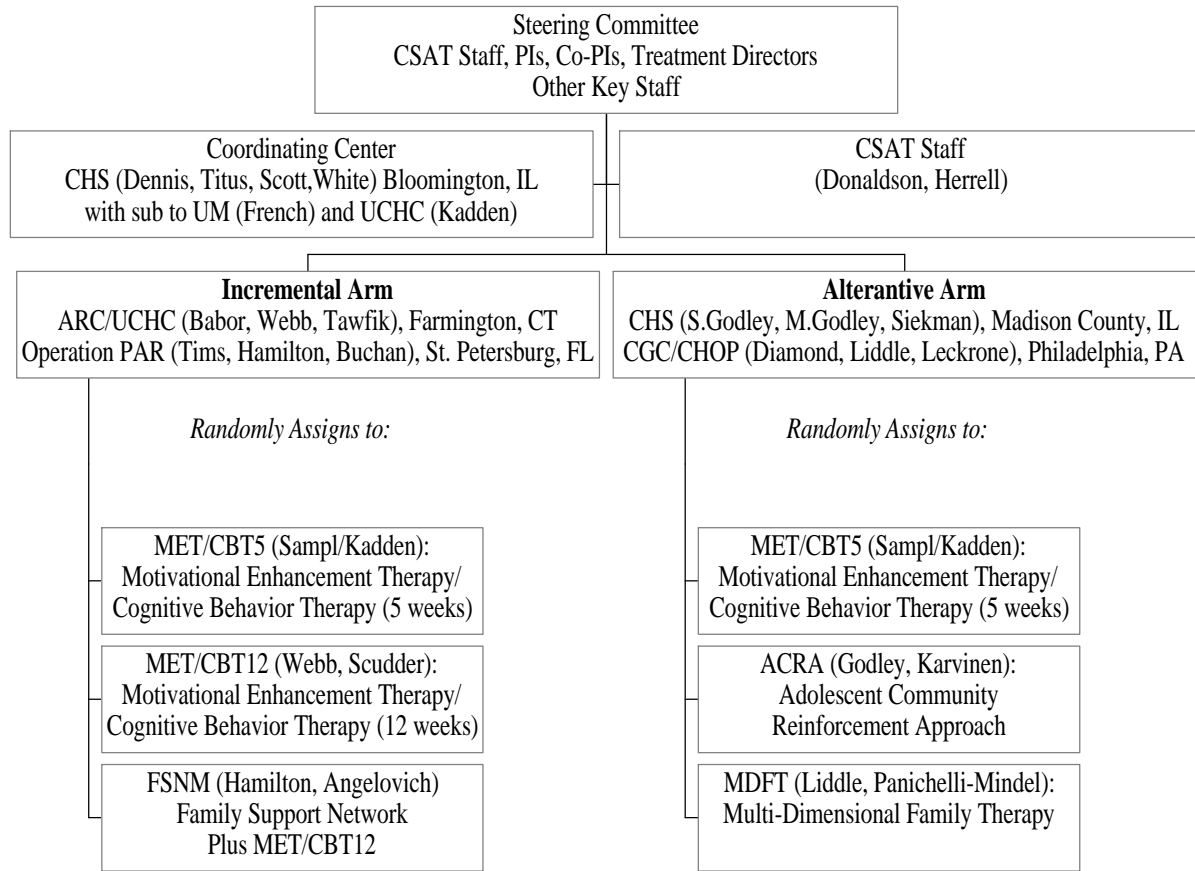
interaction. Based on NIDA funded research manuals, it is designed to integrate substance abuse treatment into the family therapy (as opposed to adding family therapy and education on top of it).

Note that a no-treatment control was considered unethical by the study's steering committee and was explicitly ruled out by CSAT. The above treatment manuals are being released by CSAT to the public in the Fall of 2000 (http://www.samhsa.gov/csat/csat.htm).

Research Design. As shown in Figure 2, the five experimental treatments were actually organized under two research arms, both comparing a five-session brief intervention with two, more intensive interventions. In the "incremental arm," each subsequent intervention builds upon and (from a resource point of view) is laid on top of the earlier ones. In the "alternative arm," additional services are provided, but in an alternative approach that requires fewer total resources. This is illustrated in terms of the type and number of expected sessions as shown in Table 1. The four sites were paired in order to counterbalance the academic medical center clinics (ARC and CGC) with the two larger community-based treatment programs (PAR and CHS-MC). Within study arm, random assignment was further blocked within site so that any site differences were evenly distributed between conditions. Analysis of the 600 adolescents randomly assigned shows only no significant differences within site in terms of gender, race, age, days of marijuana use, days of alcohol use, number of lifetime symptoms of marijuana abuse or dependence, percent experiencing medical problems, percent coming from controlled environments, and/or from single parent heads of household. All treatment conditions are replicated in two or more sites and are guided by detailed therapist manuals with expert work groups supporting them. Day-to-day supervision of the treatment was under the direction of line clinical supervisors drawn from the existing organizations. Participants were assessed with interviews and questionnaires at intake, 3, 6, 9 and 12 months.[41] To validate their self-report responses, urine tests and collateral assessments were also done at intake, three and six months. Further information on the procedures and more details on the assessment can be found elsewhere.[1]

Recruitment. Study inclusion criteria dictated that the adolescent must a) be between the ages of 12 and 18, b) meet criteria for current DSM-IV (APA, 1994) diagnosis of cannabis abuse or dependence, c) have used marijuana in the past 90 days (or 90 days prior to being in a controlled environment), and d) meet ASAM (1996) patient placement criteria for Level I (outpatient) or Level II (intensive outpatient) treatment. For safety and logistical reasons, participants were excluded if they met any of the following criteria: a) had used alcohol 45 or more days of the 90 days prior to intake (or prior to being in a controlled environment where relevant), b) had used other drugs 13 or more of the 90 days prior to intake (or prior to being in a controlled environment where relevant), c) had an acute medical condition that required immediate treatment or was likely to prohibit full participation in treatment and could not be managed in this level of care, d) had an acute psychological condition that required immediate treatment and/or was likely to prohibit full participation in treatment and could not be managed in this level of care, e) appeared to have insufficient mental capacity to understand the consent and/or participate in treatment, f) lived outside of the program's catchment area or was expected to move out within the next 90 days, g) had a history of violent behavior, severe conduct disorder,

Figure 2. Organization and Design of CYT

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                    │          Steering Committee              │
                    │ CSAT Staff, PIs, Co-PIs, Treatment Directors │
                    │            Other Key Staff               │
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        ┌──────────────────────────────────┐   ┌──────────────────────────┐
        │        Coordinating Center       │   │        CSAT Staff        │
        │ CHS (Dennis, Titus, Scott,White) │   │  (Donaldson, Herrell)    │
        │         Bloomington, IL          │   │                          │
        │ with sub to UM (French) and UCHC (Kadden) │                     │
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Incremental Arm	**Alterantive Arm**
ARC/UCHC (Babor, Webb, Tawfik), Farmington, CT Operation PAR (Tims, Hamilton, Buchan), St. Petersburg, FL	CHS (S.Godley, M.Godley, Siekman), Madison County, IL CGC/CHOP (Diamond, Liddle, Leckrone), Philadelphia, PA

Randomly Assigns to: | *Randomly Assigns to:*

MET/CBT5 (Sampl/Kadden): Motivational Enhancement Therapy/ Cognitive Behavior Therapy (5 weeks)	MET/CBT5 (Sampl/Kadden): Motivational Enhancement Therapy/ Cognitive Behavior Therapy (5 weeks)
MET/CBT12 (Webb, Scudder): Motivational Enhancement Therapy/ Cognitive Behavior Therapy (12 weeks)	ACRA (Godley, Karvinen): Adolescent Community Reinforcement Approach
FSNM (Hamilton, Angelovich) Family Support Network Plus MET/CBT12	MDFT (Liddle, Panichelli-Mindel): Multi-Dimensional Family Therapy

Table 1. Comparison of Treatment Dosage by Condition

Type of Service	Treatment Condition				
	MCB5	MC12	FSNM	ACRA	MDFT
Participant Only Individual Sessions	2	2	2	10	8
Multiple Participant Group Sessions	3	10	10		
Collateral Only Individual Sessions				2	3
Family Sessions/Home Visits			4	2	4
Multiple Family Group Sessions			4		
Total Formal Sessions	5	12	20	14	15
Casemanagement/Other Contacts			As needed	As needed	As needed
Total Expected Contacts Across Type	5	12	20+	14+	15+

predatory crime or criminal justice system involvement that was likely to prohibit full participation in treatment (e.g., pending incarceration) or that posed a real threat to other participants, h) lacked sufficient ability to use English to participate in treatment, i) had a significant other (usually a parent) who lacked sufficient ability in English to understand the collateral consent form and participate in research assessments and potentially in treatment, and j) had previously participated in the study. Of the 1244 adolescents screened, 702 (56%) were eligible – with over 20% being "too" severe for outpatient treatment (approximately the same as the national rates for residential treatment[7,8]). Of the 702 who were eligible, 600 (85%) agreed to participate – with over half saying they did not think they needed treatment or that they did not want treatment at this time.

Characteristics of Adolescents Presenting for Outpatient Cannabis Treatment. Consistent with the prior evaluations of outpatient treatment outlined above and the profile of adolescents presenting for treatment in the nation[8], the majority of the 600 participating adolescents were male (83%), in school (87%), started using under the age of 15 (85%), were currently over the age of 15 (85%), white (61%), had a history of victimization (57%), and/or from single parent families (50%) . Approximately 62% were involved in the criminal justice system at the time of intake, including 42% who were on probation, 21% awaiting a trial, 17% assigned to TASC or other diversion program, and 7% awaiting sentencing. Many were also employed (47%), coming from a controlled environment (25%), or had recently been homeless/a runaway (7%). Most faced one or more potential negative environmental influences on recovery, including regular peer use of drugs (89%) or alcohol (64%), weekly use in the home of alcohol (23%) or drugs (11%). In addition, 72% were sexually active in the past 90 days: including 39% with multiple sexual partners and 23% without any kind of protection. Relative to other levels of care for adult outpatient treatment, the adolescents seen in outpatient treatment were much more likely to be going to treatment for the first time (74% vs. 50% or more[6,7]). Their patterns of weekly substance use were dominated by marijuana smoking (71%) and alcohol consumption (17%), with other drug use being (only 1%). Lifetime injection drug use was less than 1%. Though only 20% saw their marijuana use as a problem, 96% self reported sufficient symptoms to meet criteria for abuse (50%) and/or dependence (48%). Most of those meeting criteria for dependence reported the physiological symptom of tolerance (i.e., needing more to get the same high). Table 2 compares the conditions within arm on these characteristics. Though there are a few minor differences within arm, they are less than would be expected by chance. There are several differences by arm (which should be interpreted as a variation of site differences), the most notable of which is that the adolescents in the alternative arm are more likely to be African American, female, and to be sexually active, as well as less likely to be employed.

Comorbidity. Most adolescents also had one or more co-occurring problems (Also shown in Table 2). Overall, the most common co-occurring past year problems were related to conduct disorder (53%), attention deficit/hyperactivity disorder (38%), acute emotional (27%) or memory distress (27%), acute health problems (26%), and/or pregnancy (11% of females). As shown in Figure 3, the rate of these problems is higher among those with past year dependence (48%).   In practice, dependence, these co-occurring problems, violence and illegal activity, come together to form a common dimension of global individual severity that we expected to interact with treatment effectiveness.   Both substance use and global severity were also generally higher for females and those under 15 who we believe have to reach a higher problem threshold in order for their families, schools or the courts to refer them to treatment.

Table 2. Participant Demographics by Condition and Overall

Condition		Incremental Arm			Alternative Arm			Total
		MCB5	MC12	FSNM	MCB5	ACRA	MDFT	CYT
Clients		N=102	N=96	N=102	N=100	N=100	N=100	N=600
Demographics								
Female		19%	14%	16%	21%	20%	15%	17%
Race	Asian/Pacific	1%	1%	0%	0%	0%	1%	1%
	Black	9%	14%	15%	50%	44%	47%	30%
	White	79%	71%	70%	47%	53%	47%	61%
	Puerto Rican	1%	4%	6%	1%	0%	0%	2%
	Mexican	0%	1%	0%	1%	0%	1%	1%
	Other Hispanic	4%	1%	1%	0%	1%	0%	1%
	Other	6%	8%	9%	1%	2%	4%	5%
Age	Age 13	6%	6%	5%	4%	5%	2%	5%
	Age 14	9%	9%	18%	7%	9%	11%	11%
	Age 15	22%	33%	26%	20%	23%	20%	24%
	Age 16	32%	30%	27%	37%	33%	28%	31%
	Age 17	27%	16%	25%	26%	26%	29%	25%
	Age 18	5%	5%	1%	6%	4%	10%	5%
Family								
Single parent family		44%	42%	49%	53%	59%	52%	50%
Weekly Alcohol Use in Home		31%	26%	28%	13%	26%	16%	23%
Weekly Drug Use in Home		11%	6%	13%	9%	16%	10%	11%
Social Peers								
Regular Peer Alcohol Use Socially\1		71%	66%	67%	59%	64%	60%	64%
Regular Peer Drug Use Socially\2		94%	88%	90%	83%	94%	85%	89%
Environment								
In school \3		92%	94%	86%	79%	86%	85%	87%
Employed\3		62%	60%	47%	37%	39%	36%	47%
Current CJ Involvement\3		58%	60%	54%	72%	62%	67%	62%
Controlled Environment\3		25%	27%	27%	25%	19%	29%	25%
Ever Been Victimized\4		62%	52%	45%	60%	66%	58%	57%
Ever Homeless/Runaway		5%	10%	8%	9%	5%	5%	7%
HIV Risk:								
Sexually Active\3		68%	60%	64%	81%	78%	81%	72%
Multiple Sexual Partners \3		32%	24%	37%	50%	47%	42%	39%
Had Sex without Protection\3		21%	12%	19%	29%	23%	37%	23%
Any Needle Use\3		1%	1%	0%	0%	3%	0%	1%

Table 2. Continued

	Incremental Arm			Alternative Arm			Total
Condition Clients	MCB5 N=102	MC12 N=96	FSNM N=102	MCB5 N=100	ACRA N=100	MDFT N=100	CYT N=600
Drug Use:							
Weekly Alcohol Use\3	22%	17%	11%	19%	15%	18%	17%
Weekly Marijuana Use\3	67%	70%	74%	75%	68%	74%	71%
Weekly Crack/Cocaine Use\3	0%	0%	0%	0%	0%	0%	0%
Weekly Heroin/Opiod Use\3	0%	0%	0%	0%	0%	0%	0%
Weekly Other Drug Use\3	2%	0%	1%	0%	0%	1%	1%
Age of First Use Under 15	81%	82%	85%	80%	89%	89%	85%
Significant Controlled Environment (13+ days)\3	3%	7%	7%	14%	9%	14%	9%
Substance Severity:\5							
No use	0%	0%	0%	0%	0%	0%	0%
Use	3%	2%	0%	6%	4%	9%	4%
Abuse	54%	57%	51%	46%	48%	42%	50%
Dependence	6%	3%	12%	11%	9%	13%	9%
Physiological Dependence	37%	38%	37%	37%	39%	36%	37%
Perception							
Perceives AOD as a problem\6	20%	17%	25%	19%	17%	20%	20%
Prior SA Treatment Episodes							
None	70%	77%	73%	70%	81%	75%	74%
One	13%	16%	19%	17%	13%	18%	16%
2+ episodes	18%	7%	9%	13%	6%	7%	10%
Biomedical:							
Health Problem Index\7	33%	25%	27%	25%	23%	21%	26%
Pregnant within Past Year\8	NA	NA	NA	10%	10%	13%	11%
Mental Health:							
Acute Mental Distress\9	22%	20%	28%	36%	29%	26%	27%
Acute Traumatic Distress\10	14%	11%	16%	17%	14%	12%	14%
ADHD\11	41%	32%	44%	34%	38%	38%	38%
Conduct Disorder\12	52%	51%	47%	56%	54%	58%	53%

\1 Spent time in the past year with 1 or more people socially who got drunk weekly

\2 Spent time in the past year with 1 or more people socially who used drugs quarterly

\3 During the past 90 days

\4 Attacked with a weapon, beaten to the point of bruises or broken bones, sexually assualted, or emotionally abused.

\5 Based soley on adolescent self report to S2 & S9

\6 Do you currently feel that you have any problems related to alcohol or drug use?

\7 Score of .14 or higher on HPI (Average of P9/6, P9a/90, and P9b/90)

\8 Precent of females only, 41 in MCB5, 20 in ACRA and 15 in MDFT

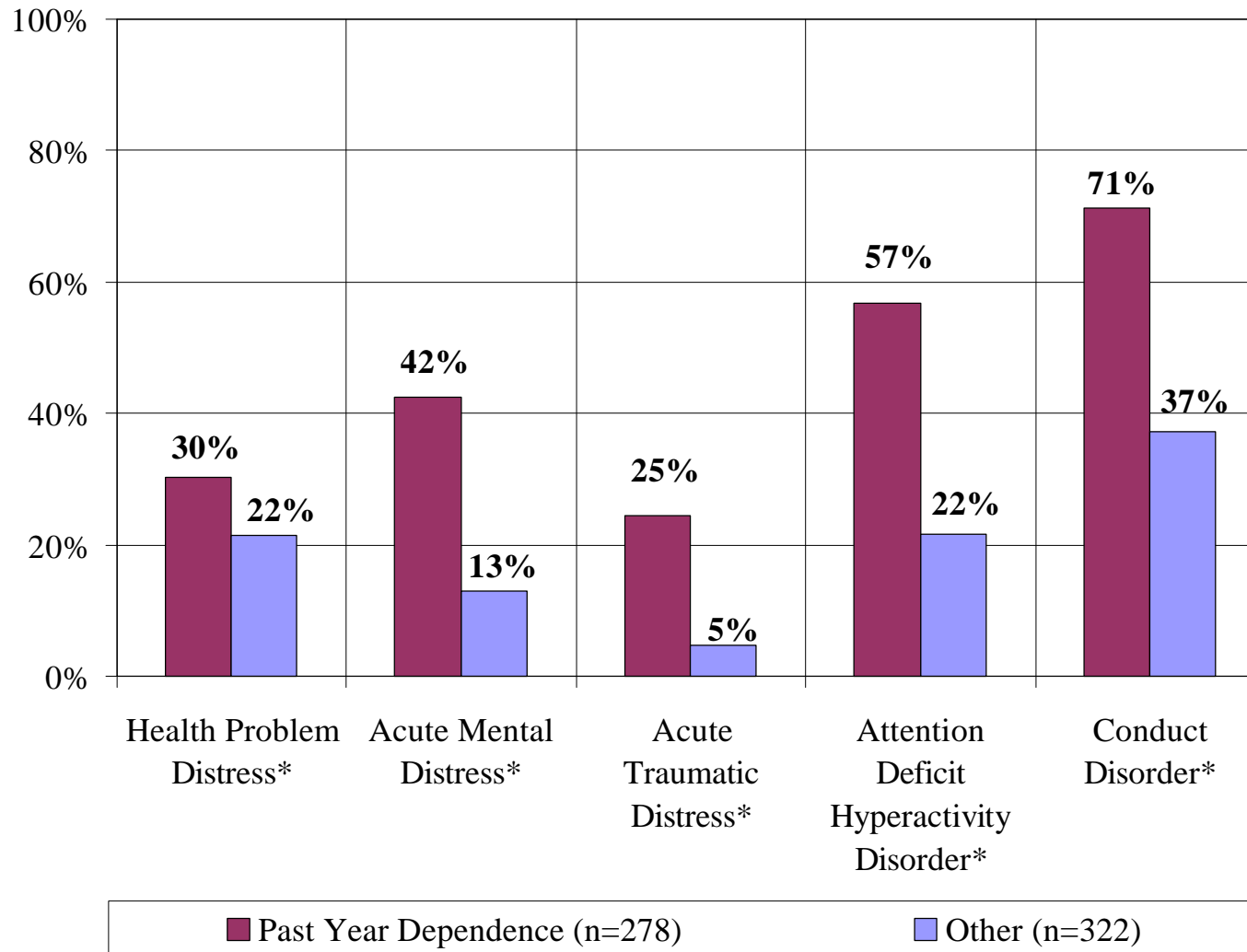\9 Acute range of GMDI (7+ symptoms on M1a1-4, M1b1-6,M1c2, M1d1-10)

\10 Acute range of the TSI (5+ symptoms on M2a-p)

\11 Clinical or acute range of the ADDI (6+ on M3a1-19 or 6+ on M3b1-16 and M3b19=1)

\12 Clinical or acute range of the CDI (3+ on M3b1-16 and M3>2 or M3c>0)

Source: Cannabis Youth Treatment (CYT) study www.chestnut.org/li/cyt

Figure 3. Health/Behavioral Distress/Disorders

Source: Cannabis Youth Treatment (CYT)

Treatment Completion. In the earlier studies, the median length of stay for adolescents in outpatient treatment was less than two months. In adapting the manuals for practice-based research, the CYT Steering Committee agreed that each manual needed explicit procedures to increase treatment retention. While the procedures varied by condition, each attempted to a) schedule regular meeting times, b) send out reminders by mail/phone, c) review transportation and childcare issues with the adolescent and caregivers, and d) contact those who missed an appointment to get them to come back. The more intensive interventions required more time and energy for compliance on the part of the participants and families and, thus, used increasingly more telephone contact and case management to increase compliance. Treatment completion in CYT was much better than in past evaluations. The average length of stay in the brief MET/CBT5 (5 to 6 weeks) intervention was 38.8 days, with 68% completing four or more formal sessions of treatment. The average length of stay in the other (12- to 13-week) interventions was 89.8 days, with 67% completing eight or more formal sessions of treatment.

Research Retention. Attrition or study dropout has been a major problem (averaging 50-70%) in adolescent research.[42,43] Because adolescents who are harder to follow are often very different than those who cooperate, low follow-up can deflate or inflate the results in unpredictable ways. This difference is important as it can be as large or larger than actual treatment differences.[44] To minimize attrition, we used a state-of-the-art approach[42] to follow-up involving extensive planning, early confirmation, multiple incentives (for both doing the interview and doing it on time), and close monitoring of every case. As a result, CYT is achieving 98% follow-up at three months, and 95% at six months. As of June 30, 2000, we have already completed 95% of those due for their 9-month follow-up and 94% of those due for a 12-month follow-up. In addition we have also completed over 90% collateral interviews and 85% of the urine tests at three- and six-month follow-ups. These are among the best rates ever achieved in adolescent or adult multi-site treatment studies to date. Almost all of the uncompleted urines occurred either because the interview was done in a jail or by phone (e.g., for a runaway) where we did not require that they be done for logistical reasons. As of July 2000, the three- and six-month CYT follow-up phases are completed (though some of the six-month data is still being keyed and cleaned). The 9- and 12-month follow-up phases will continue through November 2000 and February 2001, respectively.

Reliability and Validity of Self Reported Data. Parents, clinicians, researchers and policy makers are always concerned about the reliability (i.e., do we get the same answer if we ask the same question on two different occasions) and validity (i.e., is the answer accurate) of self-reported data from adolescents. We have already evaluated these issues in several ways: 1) by repeating several questions on drug use and dependence in the screener and main assessment, 2) by asking a collateral (typically, but not always a parent) to report on the adolescent's behaviors, 3) by comparing the answers to the results of both on-site urine testing (5-41 ng/ml) and laboratory based Gas Chromatography/Mass Spectrometry (5ng/ml), and 4) by evaluating the internal consistency of their responses across sets of related items or scales in our assessment.

   Test-Retest Reliability. A test-retest study was done over a period of 48 hours or less with 210 of the adolescents to see if they consistently reported the days of use and lifetime marijuana abuse/dependence symptoms between the screener and the more formal assessment. We found that they reported consistent but increasing numbers of days of marijuana use (31 vs. 34 days, r=.74, p<.0001), days of alcohol use (6 vs. 7 days, r=.74, p<.0001), abuse/dependence symptoms (4.6 vs. 5.3 lifetime, r=.73, p<.0001), and lifetime diagnosis (40% vs. 44% lifetime dependence,

Kappa=.55, p<.0001).[42] These rates are excellent, but also demonstrate the value of a more detailed intake assessment.

   Comparison With Family or other Collateral Reports. During the past 90 days, adolescents were more likely than family members or other collaterals to report days of any substance use (39 vs. 31 days, r=.46, p<.0001) and marijuana use (37 vs. 30, r=.46, p<.0001). They reported about the same number of days of alcohol use (7 vs. 8, r=.24, p<.0001), and symptoms of abuse/dependence during the past month (2.4 vs. 2.6 of 11 symptoms, r=.27, p<.0001), past year (4.6 vs. 4.6 symptoms, r=.21, p<.0001), and their lifetime (5.1 vs. 5.2 symptoms, r=.27, p<.0001). Though these overall rates are very similar, the correlations show that family members and other collaterals are often reporting different information for a given individual. While over 70% of the family members or other collaterals were unable to report on all of the GAIN's 16 past-month substance problems, on average they reported more total problems of abuse or dependence than the adolescent (8 vs. 7). In particular, they were more likely to report role failure, tolerance, and substance induced psychological problems. Using the combined adolescent-family/collateral information raised the average number of past month problems from 7 to 11. This suggests the importance of assessing both adolescents and their collaterals and the need to look at their combined reports.

   Comparison with Urine Tests. Because the metabolites for marijuana are fat soluble, how long they can be detected in urine can vary from a few days to a month for heavy users, depending on an individual's metabolism. (The half life among heavy users is not actually known.) We compared self reported use in the past month with whether the marijuana metabolites were present according to on-site testing and/or more rigorous (and expensive) laboratory testing [43,44]. As shown in Tables 3 and 4, there is better than 70% agreement among all comparisons – but the direction of bias shifts from higher prevalence from self reports at intake to higher prevalence from urine test results at follow-up. The kappas are generally in the moderate range, but reasonable given the variability in use and metabolism and are similar to the of kappa observed for psychiatric testing with adolescents[45]. It is also interesting to note that relative to the GC/MS (a laboratory gold standard), the less rigorous but broader band on-site testing actually had a 10% false positive rate. We are, therefore, also exploring the impact of adolescent patterns of use and individual differences in metabolism on the consistency of urine test results for marijuana. This suggest that while urine testing is excellent for measuring use in a past (unknown) period of time, it may be problematic for measuring change.

Table 3   Validity of self-reported use of marijuana in the past 30 days compared to "on-site" testing\a

Interview wave	n	Prevalence: Self-report (%)	Prevalence: On-site test (%)	Agreement (%)	Sensitivity \b	Specifity \c	Kappa
Intake	74	82.4	78.4	82.4	91.4	50.0	.444
3 months	110	55.5	69.1	70.9	69.7	73.5	.393
6 months	113	60.2	73.5	76.1	74.7	80.0	.471
Cross wave	297	64.0	73.4	75.6	77.1	72.2	.444

\a On site test reported to detect "at least" 41+ ng/ml across multiple metabolites.

\b % of urine tests with metabolites present where the adolescent reported past month use.

\c % of urine test with no metabolites present where the adolescent reported "no" past month use.

Source: Buchan et al., under review.

Table 4   Validity of self-reported use of marijuana in the past 30 days compared to laboratory-based Gas Chromatography/Mass Spectrometry testing\a

Interview wave	n	Prevalence: Self-report (%)	Prevalence: On-site test (%)	Agreement (%)	Sensitivity \b	Specifity \c	Kappa
Intake	74	82.4	73.0	79.7	92.6	45.0	.423
3 months	110	55.5	74.5	70.0	67.1	78.6	.366
6 months	113	60.2	77.9	71.7	70.5	76.0	.361
Cross wave	297	64.0	75.4	73.1	74.6	68.5	.373

\a Formal laboratory test with gas chromatography/mass spectrometry to detect 5+ ng/ml across multiple metabolites.

\b % of urine tests with metabolites present where the adolescent reported past month use.

\c % of urine test with no metabolites present where the adolescent reported "no" past month use.

Source: Buchan et al., under review.

Internal Consistency of Core Baseline Measures. Next, we checked the internal consistency of the core standardized scales (i.e., sets of items that are expected to be internally consistent). To do this we looked at Cronbach's coefficient alpha ("). The closer this is to 1, the more consistent the answers are. Alpha approaches 0 if the person is answering unreliably, if the scale contains more than one dimension, if the scale is made up of things that are not necessarily correlated (e.g., sources of income, types of stress) and as the number of items in the scale goes down. Thus, high numbers are more interpretable than low numbers. In general, alphas should be over .8 on baseline measures of core problems and .7 or higher on short subscales and/or major scales of change. In prior work with the GAIN[46] and other measures[45], it has been difficult to get internally consistent measures from adolescents in outpatient treatment, particularly when they have problems with attention deficit/hyperactivity disorders. For measures covering the year before intake, internal consistency was acceptable for baseline measures of the GAIN's Substance Problem Index (Cronbach's " = .82; including a subscales for substance use disorders and dependence with " over .7), General Mental Distress Index (" = .86; including subscales for depression, suicidality, and anxiety with " over .7), Traumatic Stress Index (" =.88), Behavior Complexity Index (" = .91, including subscales for attention deficit/ hyperactivity disorder and conduct disorder with alpha over .7); General Conflict Tactic Index of violence (" = .85), General Victimization (" = .81), General Social Support (" = .72), General Crime (" = .77), Financial Problems (" = .80), Gambling Problem (" = .80), and a total symptom count called the Global Individual Severity (" = .86 over 15 scales). In our supplemental measures we also obtained internally consistent measures on a reason for quitting scale (" =.93) adapted from CSAT's adult marijuana treatment project and earlier work with tobacco,[47] the SCID II's[48] subscales for narcissistic (" = .72) and borderline (" = .77) personalities, the Revised Dimensions of Temperament Survey[49] (with 8 of 11 subscales having " over .7), and the Child Behavior Checklist[50] (with 5 of the 11 core scales having " over .8 and 1 more .over .7).

Internal Consistency of Core Measures of Change. For measures of change at our quarterly follow-up intervals, we were also able to get internally consistent measures of the GAIN's Substance Problem Index (" = .82 on a past month version; including a subscale for dependence at " = .74), Substance Frequency Index (" = .76), Current Withdrawal Index (" = .88), Health Problem Index (" = .75), Emotional Problem Index (" = .72), Training Activity Index (" = .91), and Employment Activity Index (" = .92). The GAIN also includes questions and indices to capture service utilization in each of these areas as well as composite measures of

cognitive impairment, external pressure to be in treatment, treatment resistance, treatment motivation, stress, and recovery environment risk. In our supplemental measures we also obtained internally consistent measures on the Family Environment Scales[51] of family cohesion (" = .73), the Friends Family and Self's[52] Trouble Index (" = .80) and Familiarity with Parents Index (" = .80), the Adolescent Coping Questionnaire's[53] factor based scales of Cognitive and Behavioral Problem Solving (" = .85), Self-Critical Thinking (" = .73) and Abstinence-Focused Coping (" = .83). Methodological work is proceeding to evaluate the internal consistency of the collateral version of the GAIN, the interrelations of the preceding measures and their ability to measure and predict change.   This includes a panel presentation at the August 2000 American Psychological Association that is being written up for publication in peer reviewed journals now.
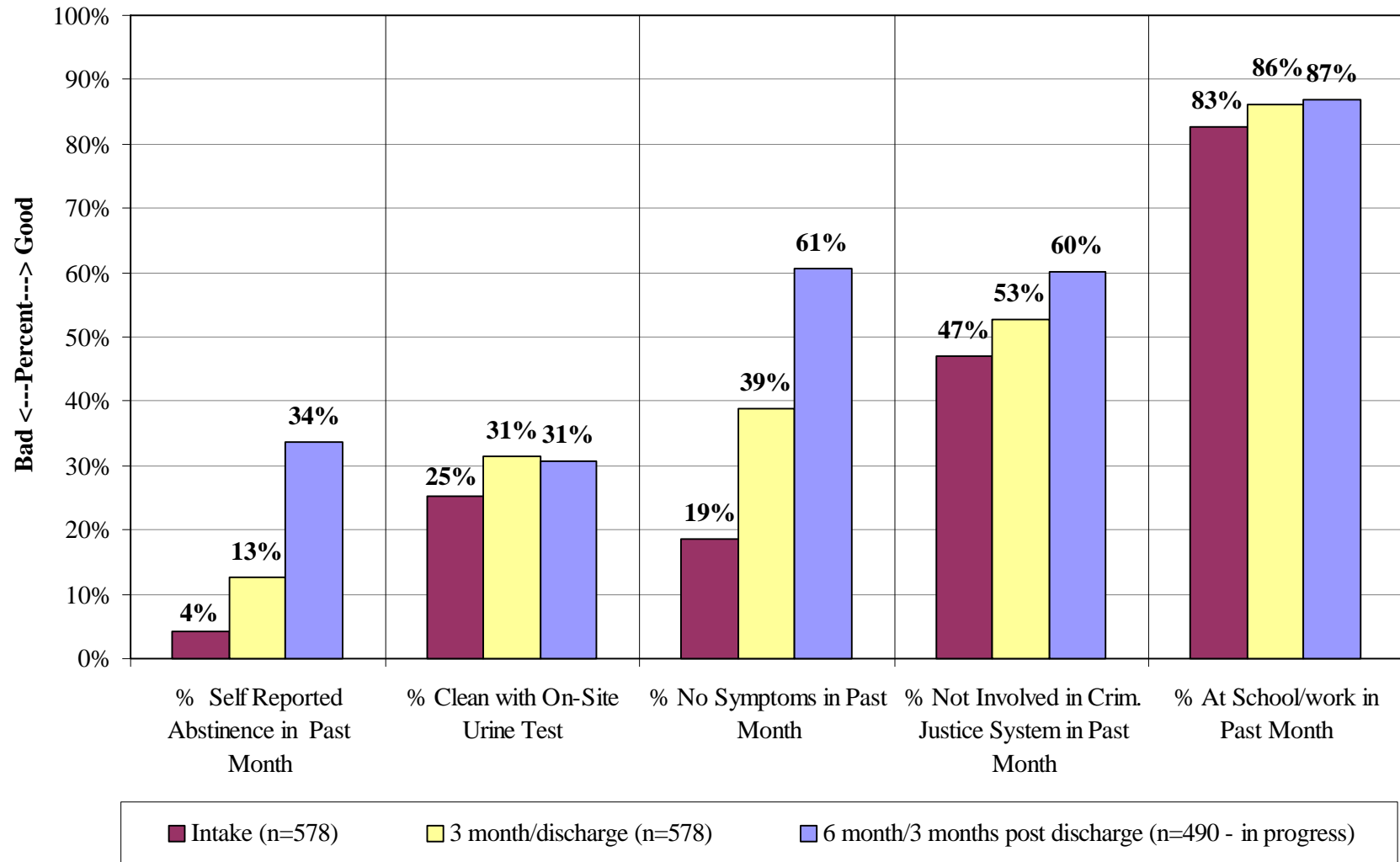
PRELIMINARY RESULTS FROM CYT

Overall Treatment Effectiveness.   On average, the five CYT treatments had a significant positive impact on the adolescents and their families. We have completed the three- and six-month follow-up interviews, but are still processing approximately 90 of the six-month interviews.   Below is a summary of the outcomes to date. Though we present the full intake and three-month data here, we have also verified that the outcomes would be similar if we subsetted only to those with six-month interviews as well.

 Substance Use and Disorders. Figure 4 shows that from intake to three months to six months, the CYT treatments increased the percent of adolescents who reported abstinence (4% to 13% to 34%), had no marijuana metabolites in their urine (25% to 31% to 31%), and had no past-month symptoms of abuse or dependence (19% to 39% to 61%). Recall that in prior evaluations of adolescent outpatient treatment practice, the change ((post-pre)/pre) in the percent of adolescents using ranged from -25% to +13%. Converting the change in abstinence to change in use (96% to 87% to 66%), CYT changed use by -31% at six months. More importantly, CYT increased the rate of early remission from 19% to 61% at six months (228% change). This represents a major improvement over prior practice.
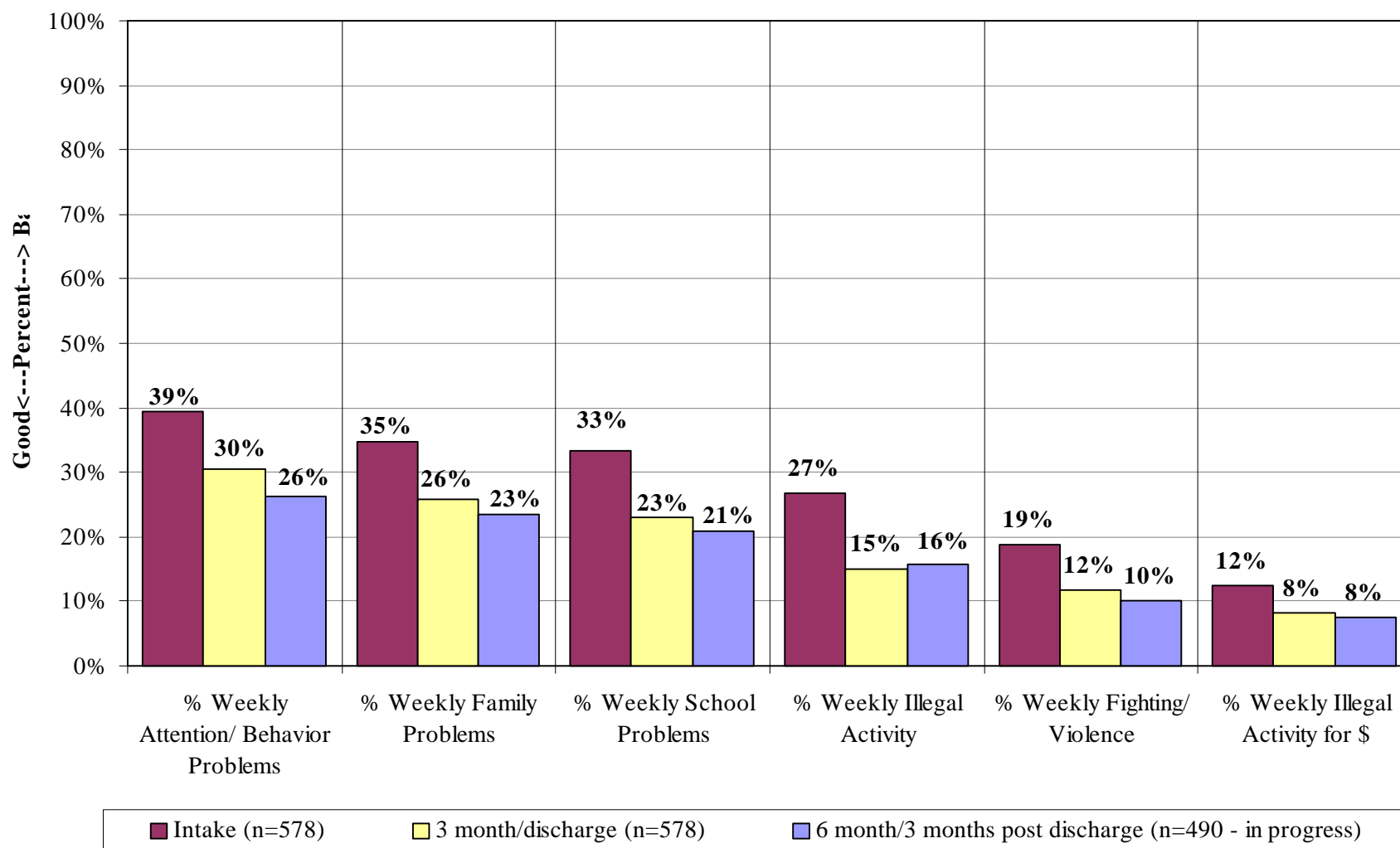
 Other Behavioral Outcomes. Figure 4 also shows that, during the same time, the percent of adolescents who were "not" involved in the criminal justice system rose from 47% to 53% to 60% and the percent who were in school or work increased from 83% to 86% to 87%. Figure 5 shows that the changes in substance use and related disorders were also associated with small but statistically significant reductions in the percent of adolescents reporting weekly use (13+ of 90 days) attention/behavior problems (39% to 30% to 26%), family problems (35% to 26% to 23%), school problems (33% to 23% to 21%), illegal activity (27% to 15% to 16%), fighting or violence (19% to 12% to 10%), and/or financially supporting oneself by illegal activity (12% to 8% to 8%).

 Subsequent Treatment. While the 6-12 week CYT treatments appear to be effective on average, there is a very important qualification to make. Approximately 21% of the adolescents went on to get additional treatment in the three months "after" CYT. On average this subset of adolescents got another 22 days of treatment (more then the initial dosage). This suggests that while effective, the kind of short-term (6-12 week) approaches used here are not sufficient for all adolescents. While subsequent treatment was not correlated with CYT treatment assignment, it presumably helps to explain at least some part of the additional gains across treatments at the six-month follow-up. The CYT team will be further exploring the impact of subsequent treatment and long-term treatment careers in the months ahead.

Figure 4. Impact of CYT Treatments on Postive Outcomes

Bad <---Percent---> Good

% Self Reported Abstinence in Past Month: Intake 4%, 3 month/discharge 13%, 6 month/3 months post discharge 34%

% Clean with On-Site Urine Test: Intake 25%, 3 month/discharge 31%, 6 month/3 months post discharge 31%

% No Symptoms in Past Month: Intake 19%, 3 month/discharge 39%, 6 month/3 months post discharge 61%

% Not Involved in Crim. Justice System in Past Month: Intake 47%, 3 month/discharge 53%, 6 month/3 months post discharge 60%

% At School/work in Past Month: Intake 83%, 3 month/discharge 86%, 6 month/3 months post discharge 87%

■ Intake (n=578)　□ 3 month/discharge (n=578)　■ 6 month/3 months post discharge (n=490 - in progress)

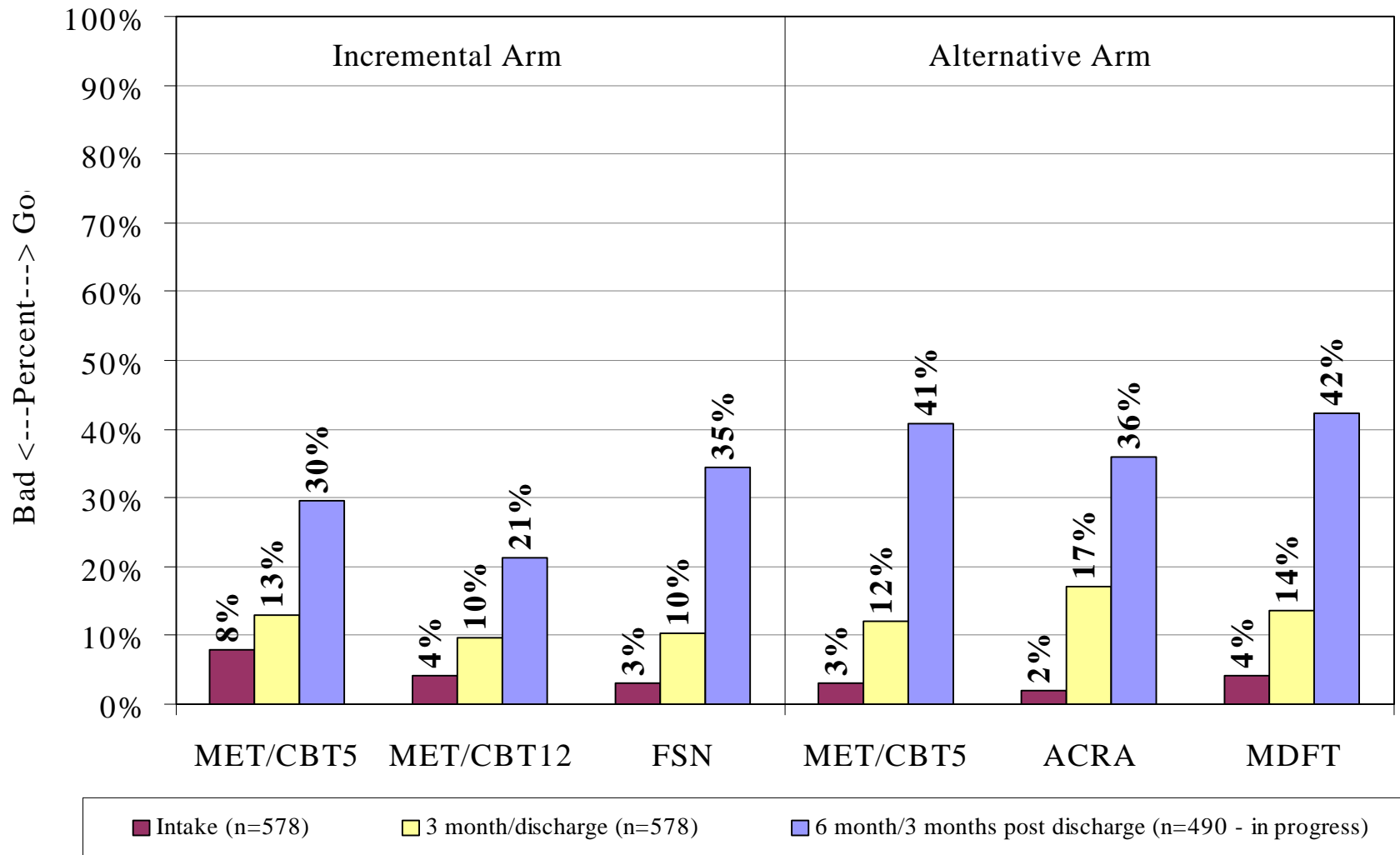**Figure 5. Impact of CYT Treatments on Other Negative Behaviors**

Relative Effectiveness of Different Types of Treatment. The key question evaluated by CYT is whether the different types of treatment examined in CYT vary in their relative effectiveness in changing substance use and problems. Figures 6 and 7 show that the change in the % abstinent and % reporting no problems (early remission) in the past month (shown in Figure 2) are generally seen in each of the individual treatment condition. To make more sensitive comparisons of these treatment groups we used a repeated measures design and controlled for site differences. We then examined the effect of treatment assignment, severity and their interactions on changes over time. For severity we used a median split (26 or greater) on the GAIN's Global Individual Severity Index (GISI) which is basically a total past- year symptom count across the scales for substance use disorders, internal distress, external problems, aggression, and illegal activity. We evaluated the impact on three-month outcomes using all of the data and on six-month outcomes using the 490 that had been keyed to date. For the latter, the data has been subsetted only to those with all three interviews. (As the rest of the 6-, 9- and 12-month analyses become available we will be expanding these analyses.) For this preliminary analysis we evaluated the impact on days of use, days of heavy use (being drunk or high for most of the day), the past-month substance problem index (which includes the abuse and dependence symptoms), days in a controlled environment (which can artificially lower these indicators), and their joint distribution (measured with Roy's Largest Root). Table 4 presents the overall results and they are summarized by study arm below.
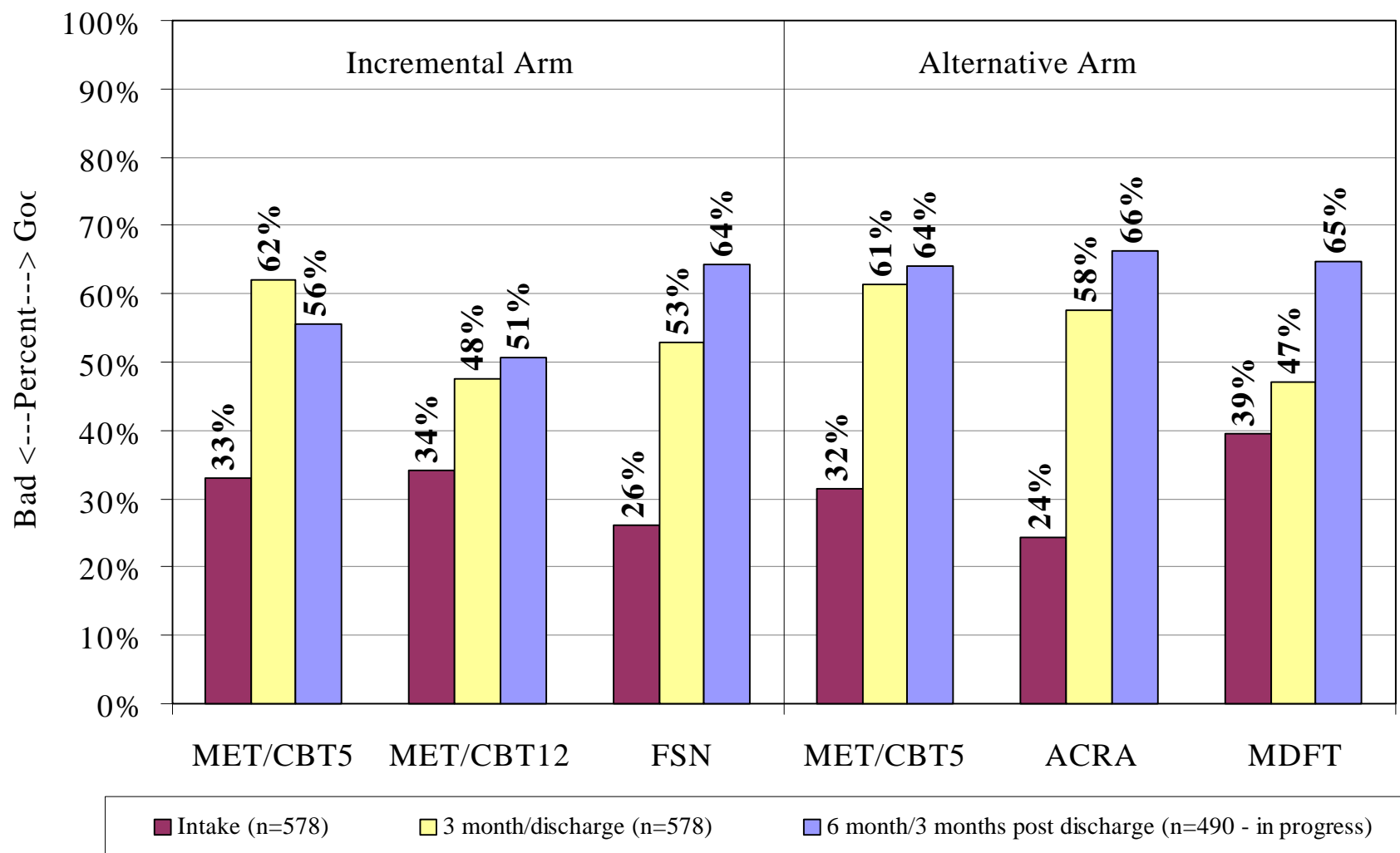
   Incremental Arm. All of the measures were correlated over time such that people with the most use or symptoms at baseline were more likely to report them at three and/or six months. No site by time interactions were statistically significant. There was a main effect of time by treatment at three and six months in terms of the substance problem index. At three months FSN reduced the number of past-month symptoms -44% (from 4.00 to 2.24) compared to -36% (from 3.65 to 2.35) in MET/CBT5 and -19% (from 3.46 to 2.82) in MET/CBT12. There were also significant interactions of severity with time (those with higher use or more problems showed greater change) and of severity with treatment by time. As illustrated in Figure 8, FSN produced greater reductions in past-month symptom counts at three months for high severity adolescents while MET/CBT5 actually did better for low severity adolescents. The pattern of outcomes appears to shift at six months. High severity adolescents continued to improve in all three treatment groups. For low severity adolescents, those assigned to FSN made further reduction, while the other two continued to maintain their previous gains. Part of the additional gain by the FSN group, however, may be due to significantly higher rates of being in a controlled environment (both inpatient treatment and detention). After a slight reduction from intake to three months, the average number of days in a controlled environment for FSN adolescents jumped 314% (from 2.7 to 2.2 to 9.2 days), compared to 77% for MET/CBT12 (from 4.0 to 3.3 to 5.9 days) and 49% for MET/CBT5 (from 3.8 to 3.3 to 5.0 days).

   Alternative Arm. From baseline to three months, all of the measures except days in a controlled environment were correlated with time. No site by time interactions were statistically significant. There was a main effect of treatment by change in days of substance use at three months such that MET/CBT5 reduced days of use by 32% (40.68 to 27.49 days), ACRA reduced days of use by 31% (from 37.14 to 25.46 days) and MDFT reduced it by 27% (40.33 to 29.26 days). All of the measures were related to our measure of global severity. As shown in Figure 9, there was a treatment by severity interaction such that the days of being in a controlled environment increased for low severity adolescents and decreased for higher severity adolescents.

Figure 6. Impact of CYT Treatments on Percent Abstinent 1+ Months

Incremental Arm

Alternative Arm

Bad <---Percent---> Good

	MET/CBT5	MET/CBT12	FSN	MET/CBT5	ACRA	MDFT
Intake	8%	4%	3%	3%	2%	4%
3 month/discharge	13%	10%	10%	12%	17%	14%
6 month/3 months post discharge	30%	21%	35%	41%	36%	42%

- ■ Intake (n=578)
- □ 3 month/discharge (n=578)
- ■ 6 month/3 months post discharge (n=490 - in progress)

Figure 7. Impact of CYT Treatments on Percent with no Past Month SUD Symptoms

Table 4. Impact of Time, Site, Treatment Assignment, and Severity on Substance Use

|			Partial Eta^2		
Measure	Time	Time x Site	Time x Treatment (Site)	Time x GISI	Time x GISI x Treatment (Site)
Incremental Arm					
From 0 to 3 months					
Days of Use	**0.12** *	0.00	0.01	0.01	0.02
Days of Heavy Use	**0.07** *	0.00	0.02	**0.02** *	0.01
Substance Problem Index	**0.11** *	0.00	**0.06** *	**0.02** *	**0.08** *
Days in Controlled Environment	**0.00** *	0.01	0.03	0.01	0.02
Roy's Largest Root	**0.16** *	0.01	**0.06** *	0.03	**0.08** *
From 0 to 3 to 6 months					
Days of Use	**0.10** *	0.01	0.03	0.00	0.04
Days of Heavy Use	**0.06** *	0.01	0.02	**0.02** *	0.01
Substance Problem Index	**0.10** *	0.00	**0.04** *	**0.03** *	**0.05** *
Days in Controlled Environment	**0.02** *	0.00	**0.04** *	0.01	0.01
Roy's Largest Root	**0.13** *	0.02	**0.06** *	**0.05** *	**0.06** *
Alternative Arm					
From 0 to 3 months					
Days of Use	**0.11** *	0.00	**0.04** *	**0.02** *	0.02
Days of Heavy Use	**0.05** *	0.00	0.03	**0.05** *	0.03
Substance Problem Index	**0.13** *	0.00	0.02	**0.02** *	0.02
Days in Controlled Environment	0.00	0.01	0.01	**0.02** *	**0.04** *
Roy's Largest Root	**0.18** *	0.01	**0.04** *	**0.08** *	**0.07** *
From 0 to 3 to 6 months					
Days of Use	**0.11** *	0.01	0.02	0.00	0.02
Days of Heavy Use	**0.05** *	0.00	0.01	0.01	0.03
Substance Problem Index	**0.13** *	0.00	0.02	0.00	0.02
Days in Controlled Environment	**0.02** *	**0.03** *	0.02	0.01	**0.04** *
Roy's Largest Root	**0.18** *	**0.04** *	**0.04** *	**0.03** *	**0.05** *

* $p<.05$

a/ Partial eta-square based on Huynh-Feldt correction for spercity and design of : Intercept+site+treatment(within site)+general individual severity index (GISI)+treatment*GISI(site)
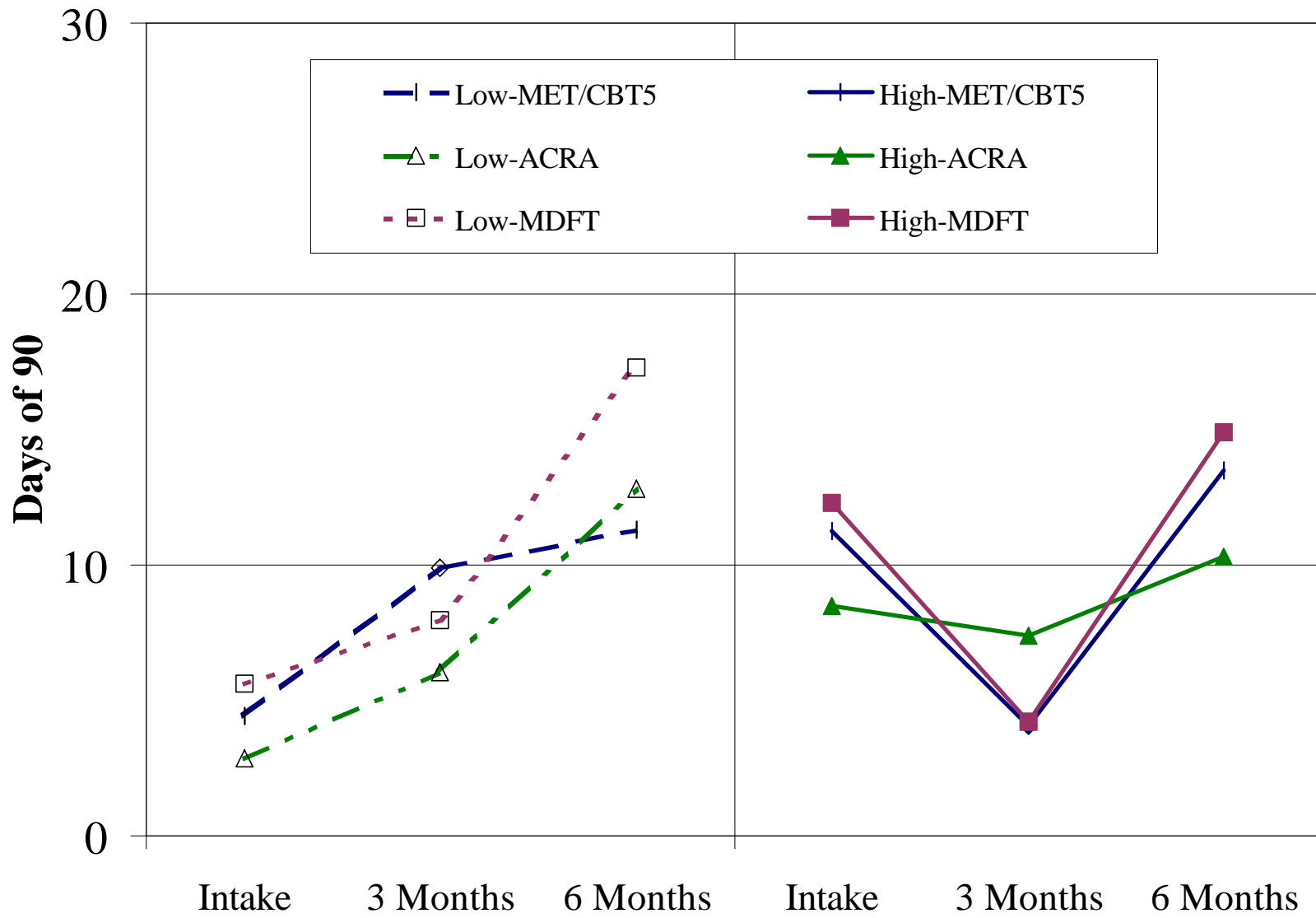
Source: Cannabis Youth Treatment Study

Figure 8. Change in Substance Problems: Incremental Arm
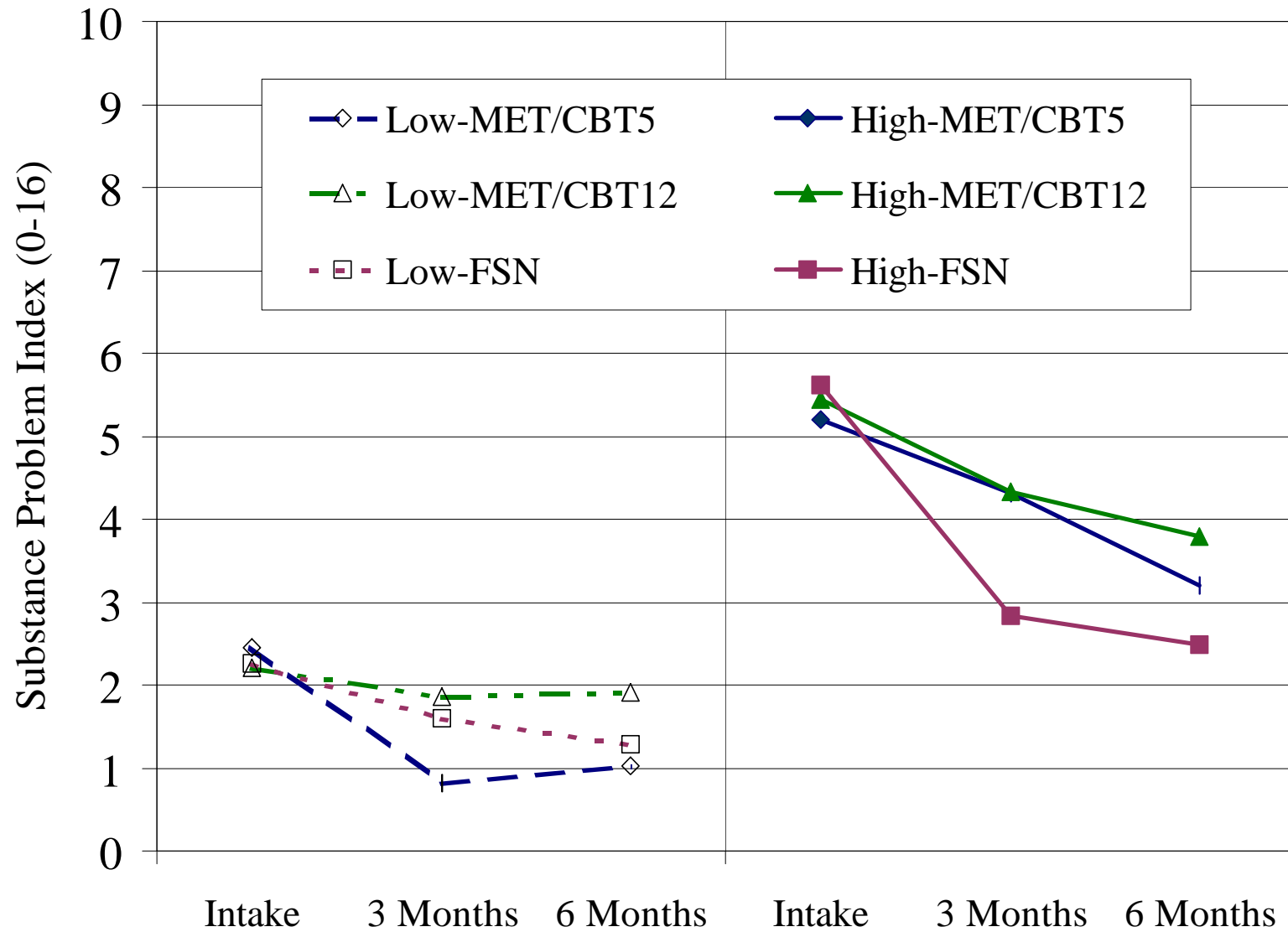
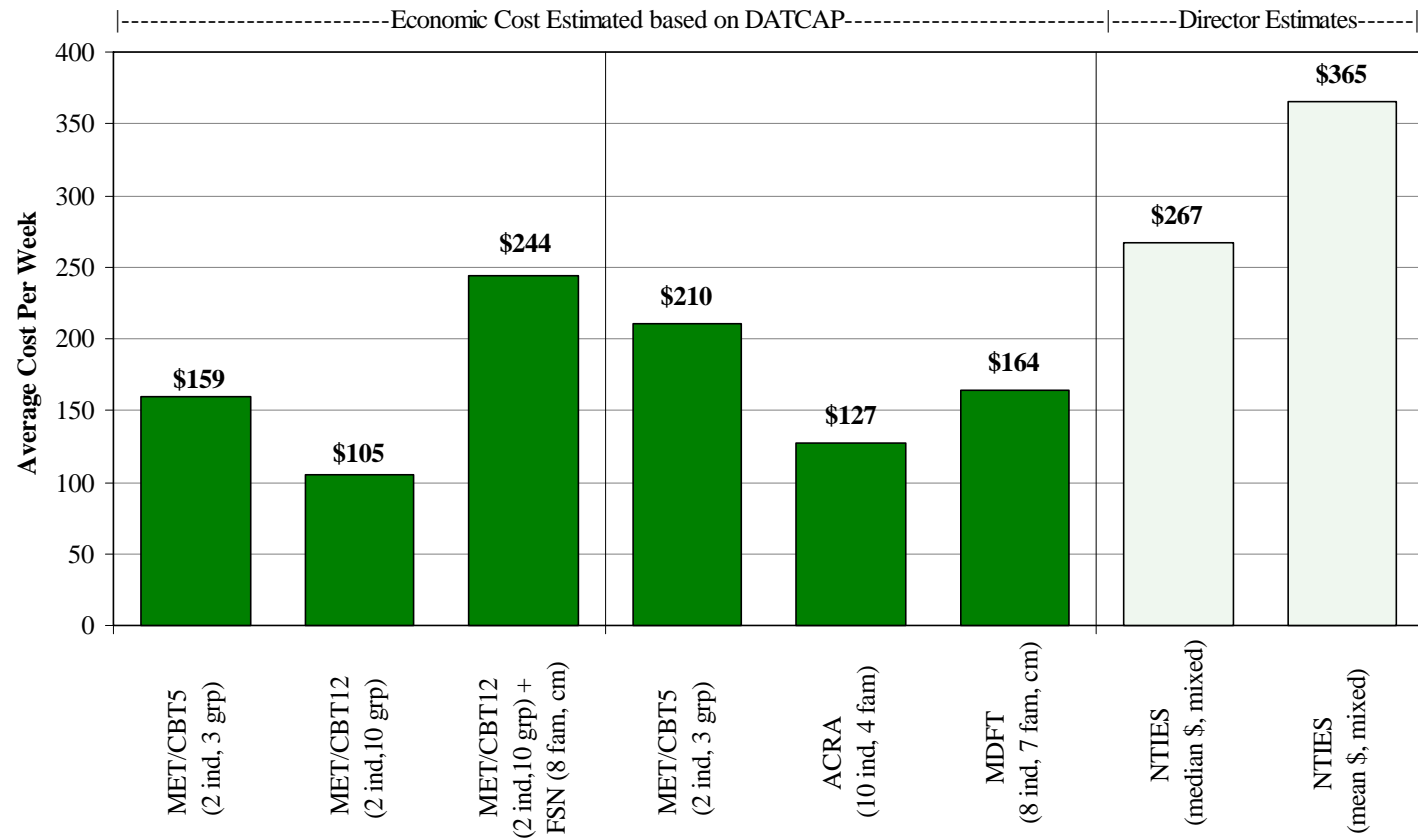# Figure 9. Change in Days of Being in a Controlled Environment: Alternative Arm

This interaction was sharpest for MDFT adolescents where low severity adolescents increased 42% (from 5.62 to 7.98 days) while high severity adolescents decreased 66% (from 12.31 to 4.23 days). At six months, a site by time interaction emerged such that the overall increases in controlled environment days where more pronounced at CGC (from 6 to 8 to 16 days) than at CHS-MC (from 3 to 7 to 8 days). Substance use continued to decline and the differences across treatment conditions were no longer statistically significant. As shown in Figure 7, the interaction between severity and treatment changes over time. The low severity adolescents continued to increase, whereas the high severity adolescents lost their three-month gains (ending higher than baseline). Although ACRA had the smallest reductions in days of being in a controlled environment at three months, it also had the smallest increases at six months.

Treatment Cost. Despite recent advances in the economic evaluation of adult substance abuse treatment, we found virtually no formal estimates of the cost of adolescent outpatient treatment (or adolescent treatment in general). One of the few studies that did attempt to get at this issue via surveys of program directors was the National Treatment Improvement Study (NTIES),[17,18] in which adolescent outpatient program directors reported a median episode cost of about $1,800 and mean cost of $2,400 ($2,138 and $2,850 after adjusting for inflation between 1994 and 1999). Treating the inflation adjusted median and mean as rough lower and upper bound estimates and dividing by the 8-week median length of stay reported by these directors translates this into an average cost of about $267 to $365 per week.

Using the Drug Abuse Treatment Cost Analysis Program (DATCAP), the economic cost of each site-specific CYT treatment was determined.[54] The average economic weekly costs of the five types of outpatient treatment ranged from $105 to $244 per week ($90 to $314 using site level estimates). As shown in Figure 10, all of the CYT treatments cost less than the lower and upper bound estimate from NTIES. The average weekly and treatment episode economic cost per condition and site are shown in Table 5. The weekly and total treatment episode costs (ranging from $1,106 to $3,470) varied by both direct factors (e.g., weeks of treatment, hours of formal treatment sessions, treatment retention) and indirect factors (e.g., cost of living, staff level, case load variation) and are further explored in the paper by French and colleagues. It is particularly important to note that, when taking into account unused capacity and a number of other factors, the shortest intervention was not always the least expensive per week or overall within a given site.

In summary, the CYT treatments all appear to be sustainable under current funding levels. Future research will integrate treatment outcomes and costs to complete cost-effectiveness and benefit-cost analyses of the five therapies.

Figure 8. Average Weekly Cost of CYT Treatments

|------------------------------Economic Cost Estimated based on DATCAP--------------------------|-------Director Estimates-----|

Table 5. Cost Estimates by Treatment Condition and Site

Arm[a]/ Treatment/ Site[b] and Location	Average Weekly Cost Per Adol.[c,d]	Median Length of Stay (weeks)	Average Cost Per Treatment Episode[e]
INCREMENTAL ARM			
MET/CBT5[f,g]	**$159**	**6.8**	**$1,106**
ARC, Farmington, CT	$148	7.4	$1,098
PAR, St. Petersburg, FL	$180	6.2	$1,119
MET/CBT5 + Cognitive Behavior Therapy 7 (MET/CBT12)[f]	**$105**	**13.4**	**$1,400**
ARC, Farmington, CT	$118	13.3	$1,563
PAR, St. Petersburg, FL	$90	13.4	$1,207
MET/CBT12+Family Support Network (FSN)[f]	**$244**	**14.2**	**$3,470**
ARC, Farmington, CT	$241	14.4	$3,472
PAR, St. Petersburg, FL	$248	14.0	$3,468
ALTERNATIVE ARM			
MET/CBT5=Motivational Enhancement Treatment/Cognitive Behavior Therapy 5 session (MET/CBT5)[f,g]	**$210**	**6.5**	**$1,361**
CHS-MC, Madison County, IL	$114	6.6	$750
CGC, Philadelphia, PA	$314	6.4	$2,020
Adolescent Community Reinforcement Approach (ACRA)[f]	**$127**	**12.8**	**$1,604**
CHS-MC, Madison County, IL	$100	13.7	$1,374
CGC, Philadelphia, PA	$152	12.0	$1,825
Multidimensional Family Therapy (MDFT)[f]	$164	13.2	$2,171
CHS-MC, Madison County, IL	$113	13.1	$1,471
CGC, Philadelphia, PA	$208	13.3	$2,762

[a] See design above.

[b] Sites are: ARC=Alcohol Research Center; PAR=Operation PAR; CHS-MC=Chestnut Health Systems, Madison County; and CGC=Child Guidance Center, Children's Hospital of Philadelphia.

[c] Based on the period 1/1/99 to 6/30/99 (in 1999 dollars).

[d] Calculated as total economic cost divided by 26 weeks divided by the number of adolescents.

[e] Calculated as the average weekly cost times the average length of stay.

[f] Accounting cost, economic cost, and total census summed; weekly and total cost calculated as noted above; length of stay and episode cost average is weighted based on weekly census.

[g] Average cost of MET/CBT5 across study arms/sites is $1,247; however these cost difference are confounded with site differences (randomization was only within site/arm) and allow for only quasi-experimental comparisons.

Source: French, Roebuck et al., under review.

CONCLUSION AND NEXT STEPS

The first goal of this project was to identify and standardize promising outpatient treatment approaches that could be disseminated to adolescent treatment providers. With the completion this summer of the five CYT treatment manuals, we have met this goal. The second goal was to conduct a field trial to evaluate their effectiveness and cost. As summarized in this report, CYT is the largest randomized experiment of adolescent outpatient substance abuse treatment ever conducted. Preliminary evidence suggests that all five treatments are associated with significant reductions in marijuana use and related problems, and appear to do better than typical practice as reported in prior national evaluations. We have conducted one of the first rigorous evaluations of adolescent treatment costs and found that all five appear to be sustainable under current funding levels. Given the current high rates of marijuana use and the increasing number of adolescents presenting for outpatient marijuana treatment, we recommend that all five manuals be released to the public as soon as possible.

While there are some differences in effectiveness and cost by treatment condition, there is also evidence that treatment effectiveness varies according to substance use severity and costs by organizational factors. Moreover, there may be logistical constraints (e.g., rural programs where group formation is difficult, availability or lack of family therapist) that may tip the balance for a given program. Thus, while we recommend that all five of the treatment manuals be publically released and their use encouraged, more work is needed before we can recommend one over the other for a given type of program or person.

While we believe that all five of the treatment protocols are sustainable under current funding levels, the challenge of getting actual programs to adopt and use them effectively should not be underestimated. We recommend that CSAT work with the administration and Congress to attempt an aggressive dissemination program modeled after the diffusion of innovation programs used by the Department of Agriculture and others. While making materials available to the public, these programs typically make a concerted effort to work with a handful of local leaders who are willing to adopt an innovation. In most of our states, as few as 5 to 10 core agencies admit 50% or more of the adolescents. If CSAT's goal is to impact practice, then a next logical step would be to approach these core agencies in states were CYT was conducted (Connecticut, Florida, Illinois, Pennsylvania) and/or other states to see if they would be willing to try replicating the protocols. Ideally, this would be coupled with technical assistance on training and quality assurance, as well as a coordinated evaluation of the implementation and outcomes similar to those CSAT requires for Targeted Capacity Expansion grants.

We also recommend further study of the impact of subsequent treatment on longer term outcomes. While the CYT treatments appeared effective, one out of five CYT adolescents went on to additional treatment in the 90 days after discharge. This is consistent with an emerging consensus among clinicians that we should <u>not</u> use fixed length of stay programs; rather the duration of treatment should be based on the adolescent's response to the initial treatment.

The CYT project has and continues to make significant advances in improving both our substantive understanding and clinical practice related to adolescent marijuana use, as well as in the areas of methodology of recruitment, assessment, comorbidity, treatment manualization, adherence, and follow-up – many of which have already been used to benefit other CSAT and NIH adolescent treatment studies. We will continue to keep CSAT abreast of these developments and regularly post our findings for the field at the project website www.chestnut.org/li/cyt .

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